4.6 AIR QUALITY

The CEQA Guidelines require an EIR to include a description of the environment in the vicinity of the Project as it exists before the commencement of the Project from both a local and regional perspective. With respect to air quality, this description includes those factors that influence the spread of pollutants, such as climatology and topographic effects, and the locations of proximate sensitive receptors who would most likely be affected by any air quality impacts. The regulatory background, including the health effects of various pollutants on which significance criteria are predicated, is also discussed, and the existing level of pollutants within the Project area are disclosed.

Unlike most projects that are still in the planning stage, the Shell Terminal has been in operation since 1915. The Shell Terminal's emissions are a part of the ambient air quality in the local and regional area, and have been included in the Bay Area regional air quality planning process. Therefore, this section also includes a discussion of these emissions in association with the Shell Terminal's permitting process. Finally, the impacts associated with continued operations under the proposed 30-year lease period are analyzed.

4.6.1 Environmental Setting

Local Climatology

The climate of the San Francisco Bay Area is characterized as maritime, where extreme variations in ambient temperatures are rare. The climate is strongly influenced by the proximity of the Pacific Ocean and the irregularities in the inland topography.

During the warmer months, the high pressure system over the Pacific Ocean off the California coast results in negligible precipitation and northwest wind flows over the Bay Area. These northwesterly flows across the Pacific result in ocean surface movement off the California coast and promote the upwelling of cold water near the San Francisco coastline. As cool, moisture-laden air approaches the coast, further cooling occurs as it flows across this cold band. This cooling is often sufficient enough to result in condensation and the formation of fog and clouds in the region during the warmer months.

In winter, when the high pressure system in the Pacific weakens, high westerly winds aloft allow frequent weather systems to move inland across northern California. With the formation of a persistent high pressure system over the mountainous regions of northeast California, winter winds in the Bay Area are from the east and northeast.

A majority of the Bay Area's precipitation occurs from November to March. Average annual rainfall for the city of Martinez is 19.6 inches. During this period, inversions are either nonexistent or very weak. Stagnant conditions are rare due to the frequent replacement of air masses with each storm.

Weather patterns influence the dispersion of pollutants. Stagnant periods, which inhibit the dispersion of pollutants in the lower atmosphere, result from abnormally high temperatures and relatively stable conditions. On warmer days when the land-sea temperature differential is high, turbulence results from the passage of westerly winds over the irregular topography, improving the dispersion of pollutants.

Site Setting and Sensitive Receptors

The site is located west of Interstate 680 on the Carquinez Strait, west of the Suisun Bay, in an industrial area of the city of Martinez. Elevations in excess of 900 feet are reached in the rugged hills of the Franklin Ridge area, located west of the city of Martinez. Topography to the north, across the Carquinez Strait (Carquinez Heights), is also quite hilly. These topographical features, located on either side of the Carquinez Strait, create a high-pressure gradient causing high wind flows through the Carquinez Strait. Mount Diablo is also a major regional topographic feature with an elevation of over 3,800 feet, located approximately 13 miles to the southeast in Mount Diablo State Park.

The proposed Project area is located in the San Francisco Bay west of the Benicia-Martinez Bridge. Ships that call on the facility, dock at the end of the wharf, located about 1,900 feet from the shoreline. There are no sensitive land uses (such as hospitals, retirement communities, or schools) located adjacent to the Shell Terminal. The nearest residential area is approximately 1,750 feet to the south of the MVR system and 3,900 feet south of the Shell Terminal berthing area.

Air Monitoring Data Near the Shell Terminal

The BAAQMD operates a regional air monitoring network for determination of compliance with air quality standards. The network consists of a series of monitoring stations used to measure the ambient concentrations of pollutants for which air quality standards have been established. Each station monitors a combination of gaseous and/or particulate pollutants either on a continuous or every 6-day basis. The data are used to describe the air quality within the surrounding community and to determine the attainment status of the air basin.

Indications of criteria pollutant levels near the Project area can be obtained by reviewing recent data collected at nearby BAAQMD monitoring stations. The air monitoring station closest to the Project site that monitors ozone (O_3), carbon monoxide (CO), and nitrogen dioxide (NO_2) is located in Crockett on Pomona Street. The Shell Terminal is located approximately 5 miles southeast of this station in an industrial area on the shoreline. The most proximate station that monitors particulates in located in Vallejo on Tuolumne Street in Solano County, almost 9 miles to the northwest of the Project site. A 3-year summary of the ambient air quality data collected at these stations is presented in Table 4.6-1.

Table 4.6-1
Air Quality Summary[1]
(Number of Days Standards were Exceeded and Maximum Levels During Such Violations)

Pollutant/Standard	2001	2002	2003
Ozone			
State 1-Hour $\geq$ 0.09 ppm	0	0	0
Federal 1-Hour > 0.12 ppm	0	0	0
Federal 8-Hour > 0.08 ppm	0	0	0
Max. 1-Hour Conc. (ppm)	0.069	0.089	0.078
Max. 8-Hour Conc. (ppm)	0.051	0.066	0.064
Carbon Monoxide			
State 8-Hour > 9.1 ppm	0	0	0
Max. 8-Hour Conc. (ppm)	1.33	1.57	1.06
Nitrogen Dioxide			
State 1-Hour $\geq$ 0.25 ppm	0	0	0
Max. 1-Hour Conc. (ppm)	0.056	0.069	0.036
Inhalable Particulates (PM_{10})[2]			
State 24-Hour > 50 $\Phi g/m^3$	1	2	0
Federal 24-Hour > 150 $\Phi g/m^3$	0	0	0
Max. 24-Hour Conc. ($\Phi g/m^3$)	58.1	83.5	39.0
Inhalable Particulates ($PM_{2.5}$)[2]			
Federal 24-Hour > 65 $\mu g/m^3$	2	1	0
Max. 24-Hour Conc. ($\mu g/m^3$)	90.1	72.3	30.8

[1] **Ozone, carbon monoxide, and nitrogen dioxide are as monitored at the Crockett monitoring station. Particulates are as monitored at the Vallejo monitoring station.**

As indicated in Table 4.6-1, the Crockett monitoring station recorded no exceedances of any gaseous criteria pollutants in the last 3 years. There were no recorded violations of the National Ambient Air Quality Standards (NAAQS) for Particulate Matter (PM_{10}) during the 3-year sample period at the Vallejo Station, but the State standards were exceeded twice in 2002 and once in 2001. The new federal $PM_{2.5}$ standard was exceeded twice in 2001 and once in 2002. There were no state or national violations recorded for nitrogen dioxide, carbon monoxide, or sulfur dioxide.

Existing Conditions at the Shell Marine Terminal

Components

The components of the Shell Terminal and vessels that are sources of emissions are discussed below. Actual emissions quantities are presented and analyzed in the impacts analysis in Section 4.6.4 Impacts Analysis and Mitigation Measures.

Vapor Control System

Like all facilities that deal with the movement of liquid materials, the wharf includes a large number of pumps, valves, flanges, and pressure relief devices. If ignored, these fittings can develop small leaks that ultimately release reactive organic gas (ROG) emissions into the air. The Shell Terminal Vapor Control System (VCS), installed in 1991, complies with the USCG regulations 33 CFR 154 for VCS operations. The system also complies with BAAQMD Regulation 8-44 (Organic Compounds, Marine Vessel Loading Terminals), which limits hydrocarbon emissions to the atmosphere from marine vessels being loaded under certain conditions (e.g., loading with high vapor pressure products). In the absence of vapor controls, hydrocarbon vapors escape from the cargo compartment when they are displaced during liquid product loading. The VCS also meets the CSLC Structural Requirements for VCS at Marine Terminals (CCR Title 2, Division 3, Chapter 1, Article 5.4).

Loading Operations

A primary source of precursor organic compound (POC) emissions from the Shell Terminal operations is from loading activities. Loading losses occur as POC vapors in "empty" cargo tanks are displaced to the atmosphere during liquid product loading. The emissions are a composite of vapors generated from the evaporation of residual liquids and vapors formed in the tank as new liquids are loaded. The quantity of vapors depends on the physical and chemical characteristics of both the previous cargo and the new cargo and the methods of loading.

The vapor control system is used to capture and destroy POC emissions from the loading of petroleum liquids.

Crude Oil Ballasting

Ballasting is the practice of loading several cargo tank compartments with seawater after the cargo has been offloaded. Ballasting of cargo tanks reduces the quantity of emissions emitted during subsequent tanker loading. During the ballasting process, POC emissions escape to the atmosphere as the vapors from nonsegregated tanks are displaced with "ballast" water. These emissions are not controlled by the vapor control system. As reported by Shell, ships do not ballast at the Shell Terminal.

Fugitives (Pumps, Valves, and Flanges)

There are numerous pipelines associated with the Shell Terminal that transport petroleum liquids between the upland facility and the wharf. The pumps, valves, and flanges associated with these pipelines are sources of fugitive emissions of POC. The leakage from these components is a function of the liquid being transported and the effects of variables, such as pressure, vibration, friction, heat, and corrosion.

Vessels

Vessels (tankers and barges) that call on the Shell Terminal contribute indirect emissions to terminal operations. These emissions are generated from the combustion of fuel oil by the vessel engines and generators as they travel, as well as emissions generated from auxiliary engines used to provide electrical and accessory power while ships are “hoteling” at the wharf.

Baseline Emissions

In order to assess the potential for an air quality impact, it is necessary to determine the baseline emissions associated with the operation of the Shell Terminal. The Refinery wharf emissions are regulated as part of Shell’s Major Facility Title V permit. Specifically, the wharf emissions are included in Shell’s Refinery Emissions Cap (REFEMS), as specified in Permit Condition Number 7618. The REFEMS permit condition sets emission limits for over 70 sources in addition to the wharf emissions. The REFEMS permit condition sets an emissions cap on the total emissions for the sum of these sources. Pollutants regulated are CO, nitrous oxides (NO_x), hydrocarbons, sulfur dioxide (SO_2), and particulate emissions. The REFEMS Cap is based on a “rolling year” basis that includes the most current 365-day period.

In general, the Shell Terminal emissions are calculated in three main parts: maneuvering, hoteling, and pumping. Emission factors are used for each of these three phases of wharf operation that take into account the vessel type/size/fuel and cargo material. Use of the emission factors in conjunction with the time required for the various modes of operation allows the emissions to be calculated.

For the purposes of this analysis, it is necessary to separate out those emissions specifically associated with the operation of the wharf. Discussion with Bhagavan Krishnaswamy of the BAAQMD (personal conversation, December 13, 2005) revealed that there is no clear interpretation of how the wharf emissions were segregated in the initial permitting process conducted in 1980. Furthermore, Shell data for this time period are also lacking. Wharf operations at that point in time were considerably greater than current operations and over 400 vessels per year was not uncommon.

Existing accessible records for emissions related to Shell Terminal operations go back to 1995. Shell records indicate that 1995 ship traffic was considerably heavier than current levels. In all, 363 vessels called on the wharf in 1995, which is a representative sampling. This value (i.e., 363 vessels per year) is used to represent baseline conditions with respect to permitted operations conducted for the wharf.

As noted, the wharf operations are included in the REFEMS along with various aspects of the Shell Refinery and its operations. As noted above, the BAAQMD does not have clear data as related directly to wharf operations and so long as Shell complies with the total REFEMS Cap, the BAAQMD is satisfied that the permit has not been violated. For the purposes of this analysis, data collected in 1995 are used to determine that percentage of the total emissions that were attributed to wharf operations. This same percentage is then used to represent the total allowable emissions under the emissions Cap. In reality, if wharf emissions were to exceed this percentage and the total emissions generated under the REFEMS Cap were to be exceeded, the Refinery could and would make cutbacks in other processes included under the REFEMS permit to reduce emissions to less than REFEMS Cap levels. Therefore, using the methodology as presented here would represent a reasonable worst-case scenario because it essentially makes the wharf stand on its own merit. Table 4.6-2 presents the 1995 emissions data used in determining the wharf's contribution to be used as the baseline conditions. Note that while CO is included in the REFEMS Cap, it is not calculated for the wharf emissions. Furthermore, the Bay Area is in attainment of the CO standards. As such, it is unlikely that CO emissions would be responsible for a significant impact, unless other emissions were also shown to exceed the applicable limitations.

Table 4.6-2
1995 Shell Terminal Annual Inventory Used
in Generating Baseline Emissions (tons)

Source	NO_x	POC	PM_{10}	SO_x
Total Wharf Emissions (tons/year)[1]	149.3	37.3	13.8	141.5
Total REFEMS Emissions (tons/year)[2]	3,115.9	145.7	263.8	1,475.1
Percentage of Total REFEMS	4.8	25.6	5.2	9.6
Total REFEMS Regulatory Limit (tons/year)[3]	3,674.7	336.8	298.8	3,006.4
Regulatory Wharf Limit (tons/year)[4]	176.4	86.2	15.5	288.4

[1] Includes those activities directly related to the operations and maintenance of the marine terminal including ship and tug emissions.
[2] Includes all sources, including wharf activities, permitted under the REFEMS Permit.
[3] Maximum emissions allowable under the REFEMS Permit.
[4] Represents the wharf's percentage of the REFEMS emissions times the total allowable emissions under the REFEMS Permit.

As noted in the table, NO_x and PM_{10} are the pollutants of primary concern because they are O_3 precursors and the Bay Area does not attain the O_3 standard. Furthermore, these emissions are closest to their applicable REFEMS Cap limitations.

In reality the REFEMS Cap limitations are dynamic and change with available technology and regulations. Similarly, wharf operations are modified to keep track of these changes such that the combined operations of the wharf and that portion of the Refinery that is tied into the REFEMS remain well within the limits of the REFEMS Cap. Table 4.6-3 compares year 2004 (the most current year that includes a full data set) with year 1995 emissions data with respect to the limits of the REFEMS Cap. Note that under the conditions of the REFEMS, neither POC nor SO_x have changed with respect to the Cap. On the other hand, both NO_x and particulates show reduction from past levels with respect to the Cap even though emissions limitations under the Cap have become increasingly more stringent.

Table 4.6-3
1995 Baseline Compared to 2004 REFEMS Annual Inventory
With Respect to the REFEMS Cap (tons)

Source	NO_x		POC		PM_{10}		SO_x	
	1995	2004	1995	2004	1995	2004	1995	2004
Wharf Percent of Total Actual REFEMS Total Emissions	26%	11%	5.2%	5%	8%	10%	5%	8%
Wharf Percent of Permitted REFEMS Cap	11%	5%	4.6%	4%	4%	5%	4%	6%
Shell Combined Percent of Total Permitted REFEMS Cap	43%	43%	88%	81%	49%	49%	85%	75%

GHG Baseline Emissions

For the purposes of GHG emissions there are two baseline emission scenarios. The 1995 GHG emissions presented in the impact section below represents the "permitted baseline." As discussed above in Section 3.2.1, Shell records from 1995 indicate that 363 vessels called on the wharf in 1995 without exceeding their overall emissions cap.
The 2007 GHG emission calculations presented below represent the "CEQA baseline" as defined by CEQA.Guideline 15125(a) which states "An EIR must include a description of the physical environmental conditions in the vicinity of the project, as they exist at the time the notice of preparation is published, or if no notice of preparation is published, at the time environmental analysis is commenced, from both a local and regional perspective. This environmental setting will normally constitute the baseline physical conditions by which a lead agency determines whether an impact is significant."

Although the notice of preparation for this EIR was circulated in 2004, reliable data from 2004 is not available. Alternatively, data from the year the GHG emission analysis commenced was utilized (2007). The 2007 data represents another "CEQA" baseline scenario.

Emissions Inventory

An emissions inventory was calculated for the existing terminal activities (2007) based upon the levels of activities provided in the Shore Terminal Annual Emissions Inventory of criteria pollutants. These activities would generate quantifiable amounts of carbon dioxide, methane, and nitrous oxide. Other recognized GHG emissions are refrigerants; these will not be emitted as a result of Shell Martinez Marine Terminal operations. The inventory was calculated using AP-42 emission factors, emission factors found in the "Analysis of Commercial Marine Vessels Emissions and Fuel Consumption Data (EPA420-R-00-002, February 2002)" published by the EPA, and the California Climate Action Registry General Reporting Protocol, version 3 (April 2008). These emissions were calculated based upon approximately 196 ocean-going vessels per year, transporting approximately 21,321,000 barrels of crude oil and/or Refinery product. Table 4.6-4 summarizes the estimated emissions inventory from current Shell Martinez Marine Terminal activities.

Table 4.6-4
Inventory Summary of Existing Terminal Greenhouse Gases (2007)

Source	CO_2 Metric Tons/yr	CH_4 Metric Tons/yr	N_2O Metric Tons/yr	CO_2E Metric Tons/yr
Ballast Emissions	0	0	0	0
Vapor Control Equipment	0	0	0	0
Fugitive Emissions	0	1	0	22
Tank Standing Losses	0	18	0	374
Tank Withdrawal Losses	0	20	0	421
Cargo Loading Emissions	0	5	0	95
Tanker Pumping Emissions	356	0	0	361
Tanker Transit Emissions	1,172	1	0	1,188
Tanker Hoteling Emissions	112	0	0	113
Tug Combustion Emissions	1,036	1	0	1,038
Total Emissions	2,676	46	0	**3,612**

Note: Totals are rounded.

As shown in Table 4.6-4, the primary sources of GHG emissions are from the tanker transit emissions and tug combustion emissions at 1,188 and 1,038 metric tons per year, respectively.

4.6.2 Regulatory Setting

Air Quality Standards

Federal Regulations/Standards

The federal Clean Air Act (CAA) required the EPA to identify NAAQS to protect public health and welfare. NAAQS have been established for the six “criteria” air pollutants including O_3, CO, nitrogen dioxide NO_2, sulfur dioxide SO_2, suspended particulate matter (PM_{10}, $PM_{2.5}$), and lead (Pb), so-called because the standards were based on a health criteria document. The NAAQS are summarized in Table 4.6-5.

Air basins, or portions thereof, are classified under the CAA as either “attainment” or “nonattainment” for each criteria air pollutant, based on whether or not the NAAQS have been achieved. The 1990 CAA Amendments gave the EPA new authority to define the boundaries of nonattainment areas. O_3 nonattainment areas have been categorized as "severe," "serious," "moderate," or "marginal." The CO and PM_{10} nonattainment regions have been divided into "serious" and "moderate" classifications. In June 2004, the San Francisco Bay Area Air Basin was categorized as marginal non-attainment for the national 8-hour ozone standard. (The national 1-hour ozone standard was revoked by the USEPA on June 15, 2005.) The Basin is unclassified for the 24-hour PM_{10} standard, but does attain all other national particulate and gaseous emissions standards.

Marginal nonattainment areas must meet the national 8-hour ozone standard by June 15, 2007. Specific planning requirements for 8-hour marginal nonattainment areas are not yet fully established, as EPA has not issued Phase 2 of the 8-hour implementation rule and certain elements of the Phase 1 are subject to legal challenge. It is not currently anticipated that marginal areas will be required to prepare attainment

Table 4.6-5
Ambient Air Quality Standards

Pollutant	Averaging Time	California Standards[1]		Federal Standards[2]		
		Concentration[3]	Method[4]	Primary[3,5]	Secondary[3,6]	Method[7]
Ozone	1 Hour	0.09 ppm (180 µg/m^3)	Ultraviolet Photometry	0.08 ppm (157 µg/m^3)[8]	Same as Primary Std.	Ethylene Chemiluminescence
	8 Hour	0.070 ppm (137 µg/m^3)				
Carbon Monoxide	8 Hour	9.0 ppm (10 mg/m^3)	Nondispersive Infrared Spectroscopy (NDIR)	9 ppm (10 mg/m^3)	None	Non-dispersive Infrared Spectroscopy (NDIR)
	1 Hour	>20 ppm (23 mg/m^3)		35 ppm (40 mg/m^3)		
Nitrogen Dioxide	Annual Arithmetic Mean	---	Gas Phase Chemilumine scence	>0.053 ppm (100 µg/m^3)	Same as Primary Std.	Gas Phase Chemiluminescence
	1 Hour	0.25 ppm (470 µg/m^3)		---		
Sulfur Dioxide	Annual Arithmetic Mean	---	Fluorescence	0.030 ppm (80 µg/m^3)	---	Pararosaniline
	24 Hour	0.04 ppm (105 µg/m^3)		0.14 ppm (365 µg/m^3)	---	
	3 Hour	---		---	0.5 ppm (1,300 µg/m$^{3)}$	
	1 Hour	0.25 ppm 655 µg/m^3		---	---	
Respirable Particulate Matter (PM_{10})	Annual Arithmetic Mean	20 µg/m^3	Gravimetric or Beta Attenuation	50 µg/m^3	Same as Primary Stds.	Inertial Separation and Gravimetric Analysis
	24 Hour	>50 µg/m^3		150 µg/m^3		
Respirable Particulate Matter ($PM_{2.5}$)	Annual Arithmetic Mean	12 µg/m^3	Gravimetric or Beta Attenuation	15 µg/m^3	Same as Primary Stds.	Inertial Separation and Gravimetric Analysis
	24 Hour	No Separate State Standard		65 µg/m^3		

Table 4.6-5 (continued)
Ambient Air Quality Standards

<table>
<tr><th rowspan="2">Pollutant</th><th rowspan="2">Averaging Time</th><th colspan="2">California Standards[1]</th><th colspan="3">Federal Standards[2]</th></tr>
<tr><th>Concentration[3]</th><th>Method[4]</th><th>Primary[3,5]</th><th>Secondary[3,6]</th><th>Method[7]</th></tr>
<tr><td>Visibility Reducing Particulates</td><td>8 Hour (10 a.m. to 6 p.m., PST</td><td colspan="2">In sufficient amount to produce an extinction coefficient of 0.23 per kilometer-visibility of 10 miles or more due to particulates when the relative humidity is less than 70 percent.</td><td colspan="3">No Federal Standards</td></tr>
<tr><td>Sulfates</td><td>24 Hour</td><td>25 µg/m^3</td><td>Turbidimetric Barium Sulfate</td><td colspan="3">No Federal Standards</td></tr>
<tr><td>Hydrogen Sulfide</td><td>1 Hour</td><td>0.03 ppm (42 µg/m^3</td><td>Cadmium Hydroxide STRactan</td><td colspan="3">No Federal Standards</td></tr>
<tr><td rowspan="2">Lead</td><td>30-Day Average</td><td>1.5 µg/m^3</td><td rowspan="2">Atomic Absorption</td><td>---</td><td>---</td><td rowspan="2">High Volume Sampler and Atomic Absorption</td></tr>
<tr><td>Calendar Quarter</td><td>---</td><td>1.5 µg/m^3</td><td>Same as Primary Std.</td></tr>
</table>

[1] California standards for ozone, carbon monoxide (except Lake Tahoe), sulfur dioxide (1 and 24 hour), nitrogen dioxide, suspended particulate matter—PM_{10}, $PM_{2.5}$, and visibility reducing particles, are values that are not to be exceeded. All others are not to be equaled or exceeded. California ambient air quality standards are listed in the Table of Standards in Section 70200 of Title 17 of the California Code of Regulations.

[2] National standards (other than ozone, particulate matter, and those based on annual averages or annual arithmetic mean) are not to be exceeded more than once a year. The ozone standard is attained when the fourth highest eight hour concentration in a year, averaged over three years, is equal to or less than the standard. For PM_{10}, the 24 hour standard is attained when the expected number of days per calendar year with a 24-hour average concentration above 150 µg/m3 is equal to or less than one. For $PM_{2.5}$, the 24 hour standard is attained when 98 percent of the daily concentrations, averaged over three years, are equal to or less than the standard.

[3] Concentration expressed first in units in which it was promulgated. Equivalent units given in parentheses are based upon a reference temperature of 25°C and a reference pressure of 760 torr. Most measurements of air quality are to be corrected to a reference temperature of 25°C and a reference pressure of 760 torr; ppm in this table refers to ppm by volume, or micromoles of pollutant per mole of gas.

[4] Any equivalent procedure which can be shown to the satisfaction of the CARB to give equivalent results at or near the level of the air quality standard may be used.

[5] National Primary Standards: The levels of air quality necessary, with an adequate margin of safety to protect the public health.

[6] National Secondary Standards: The levels of air quality necessary to protect the public welfare from any known or anticipated adverse effects of a pollutant.

[7] Reference method as described by the EPA. An "equivalent method" of measurement may be used but must have a "consistent relationship to the reference method" and must be approved by the EPA.

[8] New federal 8-hour ozone and fine particulate matter standards were promulgated by U.S. EPA on July 18,1997.

demonstrations for the 8-hour standard. Other planning elements may be required. As 8-hour planning requirements become clear, the Bay Area will address the requirements in subsequent documents. In addition, in anticipation of the implementation rule, the Air District is working in collaboration with the California Air Resources Board (CARB) and other Northern California air districts through the Northern California Agencies SIP/ Transport Working Group to address 8-hour planning requirements for other regions in Northern California.

State Regulations/Standards

California began setting air quality standards in 1969 with the passage of the Mulford-Carrell Act, before NAAQS were established. There are considerable differences between State and federal standards currently in effect in California, due to the unique meteorological problems in the state and the differences of opinion from medical panels established by the CARB and the EPA regarding pollutant levels that protect susceptible members of the population from adverse health impacts with an adequate degree of safety (Table 4.6-5). In addition to its more stringent ambient air quality standards, California uses more stringent regulations than the federal government for vehicle emissions, under a program administered by CARB.

These standards are the levels of air quality considered safe, with an adequate margin of safety, to protect the public health and welfare. They are designed to protect those "sensitive receptors" most susceptible to respiratory distress, such as asthmatics, the elderly, very young children, people already weakened by other disease or illness, and persons engaged in strenuous work or exercise. A description of each pollutant type and its effects is presented below.

<u>Ozone (O_3)</u> – O_3 is one of a number of substances called photochemical oxidants that are formed when ROG and NO_x, both byproducts of the internal combustion engine, react in the presence of ultraviolet sunlight. O_3 is present in relatively high concentrations in the air basin, and the damaging effects of photochemical smog are generally related to the concentrations of O_3. O_3 may pose its worst health threat to those who already suffer from respiratory diseases. This health problem is particularly acute in sensitive receptors such as the sick, the elderly, and young children. O_3 levels peak during the summer and early fall months.

<u>Carbon Monoxide (CO)</u> – CO is a colorless, odorless, toxic gas which is produced by incomplete combustion of carbonous substances (e.g., gasoline or diesel fuel). The primary adverse health effect associated with CO is the interference of normal oxygen transfer to the blood, which may result in tissue oxygen deprivation.

<u>Fine Particulate Matter</u> – Fine particulate matter consists of finely divided solids or liquids such as soot, dust, aerosols, fumes, and mists. Two forms of fine particulate are now recognized. Course particles, or PM_{10}, include that portion of the particulate matter with an aerodynamic diameter of 10 microns (i.e., ten one-millionths of a meter or 0.0004 inch) or less. Fine particles, or $PM_{2.5}$, have an aerodynamic diameter of 2.5 microns (i.e., 2.5 one-millionths of a meter or 0.0001 inch) or less. Particulate discharge into the atmosphere results primarily from industrial, agricultural, construction, and transportation activities. However, wind action on the arid landscape also contributes substantially to the local particulate loading. Both PM_{10} and $PM_{2.5}$ may adversely affect the human respiratory system, especially in those people who are naturally sensitive or susceptible to breathing problems.

Nitrogen Dioxide (NO_2) – NO_2 is a byproduct of fuel combustion. The principle form of NO_2 produced by combustion is nitric oxide (NO), but NO reacts quickly to form NO_2, creating the mixture of NO and NO_2 commonly called NO_x. NO_2 acts as an acute irritant and, in equal concentrations, is more injurious than NO. At atmospheric concentrations, however, NO_2 is only potentially irritating. There is some indication of a relationship between NO_2 and chronic pulmonary fibrosis. Some increase in bronchitis in children (2 and 3 years old) has also been observed at concentrations below 0.3 ppm. NO_2 absorbs blue light, the result of which is a brownish-red cast to the atmosphere and reduced visibility. NO_2 also contributes to the formation of PM_{10}.

Sulfur Dioxide (SO_2) – SO_2 is a colorless, pungent, irritating gas formed by the combustion of sulfurous fossil fuels. Fuel combustion is the primary source of SO_2. At sufficiently high concentrations, SO_2 may irritate the upper respiratory tract. At lower concentrations and when combined with particulates, SO_2 may do greater harm by injuring lung tissue.

Lead (Pb) – Pb in the atmosphere occurs as particulate matter. In the past the combustion of leaded gasoline was the primary source of lead emissions. Other sources of Pb include the manufacturing of batteries, paint, ink, ceramics, and ammunition, and secondary lead smelters. With the phase-out of leaded gasoline, secondary lead smelters and battery recycling and manufacturing facilities are becoming lead emission sources of greater concern. Prolonged exposure to atmospheric Pb poses a serious threat to human health.

Reactive Organic Gases – ROGs are compounds comprised primarily of atoms of hydrogen and carbon. Internal combustion associated with motor vehicles is the major source of hydrocarbons. Adverse effects on human health are not caused directly by ROG, but rather by reactions of ROG to form secondary air pollutants including O_3. Note that for the purposes of this analysis, ROG, reactive organic compounds (ROC), volatile organic compounds (VOC), hydrocarbons (HC), POC, and non-methane hydrocarbons (NMHC), are used synonymously.

Fugitive Dust – Fugitive dust poses primarily two public health and safety concerns. The first concern is that of respiratory problems attributable to the suspended particulates in the air. The second concern is that of motor vehicle accidents caused by reduced visibility during severe wind conditions. Fugitive dust may also cause significant property damage during strong wind storms by acting as an abrasive material agent (much like sandblasting activities).

The California Clean Air Act (CCAA), which became effective on January 1, 1989, provides a planning framework for attainment of the California Ambient Air Quality Standards (CAAQS). Nonattainment areas in the state were required to prepare plans for attaining the CAAQS. The CCAA provided for the classification of regions within the state into four classes: “moderate,” “serious,” “severe,” and “extreme.” Regional classifications are determined by monitoring data taken during the 1989-1991 baseline period, as follows:

Ozone

Classification	Highest 1-Hour Level
Moderate	0.09 ppm to 0.12 ppm
Serious	0.13 ppm to 0.15 ppm
Severe	0.16 ppm to 0.20 ppm
Extreme	> 0.20 ppm

Carbon Monoxide

Classification	Highest 8-Hour Level
Moderate	9.0 ppm to 12.7 ppm
Serious	> 12.7 ppm

The Basin is currently classified as "serious" nonattainment of the state ozone standards, but is in attainment of the CO standards. For regions in any class, attainment plans are required to demonstrate a 5 percent per year reduction in the emissions of nonattainment pollutants or their precursors, unless all feasible measures are being employed.

The 1990 CAA Amendments represent a major revision of the original statute. They specify new strategies for attaining federal air quality standards, including mandatory 3 percent annual reductions of air pollutant emissions in areas exceeding federal standards, new offset requirements for new stationary sources of air pollutants, the scheduled introduction of low-emitting cars and trucks into the motor vehicle fleet, and the development of alternatives to the private automobile as the primary means of transportation.

Bay Area Air Quality Management District, the Clean Air Plan, and the Ozone Strategy

The BAAQMD has jurisdiction over the San Francisco Bay Air Basin including Contra Costa County. The BAAQMD has permit authority over all stationary sources of air pollutants and acts as the primary reviewer of air quality issues in environmental documents. The agency also provides technical and monitoring support, as well as enforcement of rules and regulations. The BAAQMD was also mandated to meet state standards by the earliest date achievable using reasonably available measures.

The *Bay Area 1991 Clean Air Plan* (*CAP*), adopted on October 30, 1991, was prepared in response to requirements of the CCAA. The Plan included methods to lower ground-level O_3 in the San Francisco Bay Area and included a comprehensive strategy to reduce air pollution throughout the Basin. The *1991 CAP* focused on control measures to be implemented during the 1991 to 1994 period, and also included control measures to be implemented from 1995 through the year 2000 and beyond.

The Plan was updated to the *Bay Area 1994 CAP* in 1994 and serves as a continuation of the comprehensive strategy established in 1991. The 1994 Plan included changes in the organization and scheduling of some *1991 CAP* measures and also includes eight new proposed stationary and mobile source control measures. The *1994 CAP* included a comprehensive strategy to reduce air pollutant emissions, focused on control measures to be implemented during the 1994 to 1997 period, and also included control measures to be implemented from 1998 through the year 2000 and beyond.

The *CAP* was again updated in 1997. This plan was a continuation of the comprehensive strategy established in the region's first plan, the *1991 CAP*, to attain the state ozone standard. The *Bay Area 1997 CAP* included changes in the organization and scheduling of some *1994 CAP* control measures and also includes 12 proposed new stationary and mobile source control measures, as well as two new transportation control measures. The *1997 CAP* covered the period to the next California air quality planning update of 2000. It also included projections of pollutant trends and possible emission reduction activities beyond 2000.

The goals of the *CAP* are to reduce the health impacts from O_3 levels to below the state ambient standard and to comply with the CCAA. The Act requires air districts that exceed the state ozone standard to reduce pollutant emissions by 5 percent per year, calculated from 1990, or take all feasible measures to achieve emission reductions. The Bay Area attained the state CO standard in 1993, so the CCAA planning requirements for CO nonattainment areas no longer apply to the Bay Area. The control measures proposed in the *CAP* constitute all feasible measures for the reduction of O_3 precursor emissions in the Bay Area.

The most current *CAP* was the *Bay Area 2000 Clean Air Plan and Triennial Assessment* adopted December 20, 2000. Consistent with CCAA requirements, the strategy for this air quality plan is to implement all feasible measures on an expeditious schedule in order to reduce ozone precursor pollutant emissions as quickly as possible. As in previous iterations of the *Clean Air Plan*, this update defines feasible measures as "those control measures which are: (1) reasonable and necessary for the San Francisco Bay Area; (2) capable of being implemented in a successful manner within a reasonable period of time, taking into account economic, environmental, legal, social, and technological factors; and (3) approved or approvable by CARB, based upon state law and CARB policies."

The focus of this plan update is on measures that could be developed and adopted as regulations over the following three year period (2001, 2002, and 2003). To update the plan, BAAQMD staff examined measures from the *1997 Clean Air Plan* that had not yet been implemented. In addition, staff evaluated possible new control measures, through an extensive review of rules adopted or proposed in other jurisdictions. In conducting this review, the District evaluated the following information:

- Regulations adopted or proposed by the South Coast Air Quality Management District (SCAQMD) and by other California air districts,

- State Implementation Plan (SIP) submittals by various states,

- CARB guidance on feasible control measures,
- BAAQMD Best Available Control Technology (BACT) guidance, and
- EPA guidance documents.

In addition to reviewing the above sources of information, District staff polled District engineers and enforcement staff for suggestions about potential control measures. All potential control measures were then evaluated based on emission reduction potential, technological feasibility, enforceability, cost-effectiveness, and public acceptability to determine whether measures would be feasible for the Bay Area. The measures that appeared feasible were added to the regulatory agenda. This review showed that the following new measures should be added to the *CAP*:

- Improved Automobile Refinish Coatings Rule,
- Improved Wood Products Coatings Rule,
- VOC limits for Concrete Coating Operations, and
- Improved Residential Water Heaters Rule.

This *CAP* update like the updates in 1994 and 1997 increases *CAP* effectiveness by increasing expected emission reductions. The net effect of the 2000 update in adding new control measures while deleting some of the old measures was to increase expected emission reductions by 3.7 tons per day. By comparison, the 1994 update added three and deleted five stationary source measures, while adding five mobile source measures. The net effect of the 1994 update was to increase expected emission reductions by 3.8 tons per day. The 1997 update added six and deleted two stationary source measures. The net effect of the 1997 update was to increase expected emission reductions by 2.2 tons per day. Though it is not possible or meaningful to compare the 1991 estimate for total emission reductions expected from the plan against current estimates because many emission factors used to make emission inventory and emission reduction estimates have changed since 1991, the total emission reduction attributable to the plan has increased with each update. The major benefits of the *CAP* are reduced health impacts from population exposure to O_3. Additional expected benefits are reductions in particulate matter, traffic congestion, energy use, global warming, crop damage, and water pollution.

As noted, the first Bay Area plan for the state ozone standard was the *1991 Clean Air Plan*. Subsequently, the *Clean Air Plan* was updated and revised in 1994, 1997, and 2000. Each of these triennial updates proposed additional measures to reduce emissions from a wide range of sources, including industrial and commercial facilities, motor vehicles, and area sources. The BAAQMD recently released the Draft *Bay Area 2005 Ozone Strategy* (*Ozone Strategy*) (September 2005) as its current contribution to the State Implementation Plan (SIP) replacing the *2000 CAP*.

The *Ozone Strategy* describes how the Bay Area will fulfill CCAA planning requirements for the state one-hour ozone standard and transport mitigation requirements through the proposed control strategy. The control strategy includes stationary source control measures to be implemented through Air District regulations; mobile source control measures to be implemented through incentive programs and other activities; and transportation control measures to be implemented through transportation programs in cooperation with MTC, local governments, transit agencies, and others. Under the *Ozone Strategy*, the District will continue to adopt regulations, implement programs, and work cooperatively with other agencies, organizations and the public on a wide variety of strategies to improve air quality in the region and reduce transport to neighboring air basins.

The *2005 Ozone Strategy* explains how the Bay Area plans to achieve these goals with regard to O_3, and also discusses related air quality issues of interest including the public involvement process, climate change, fine particulate matter, the Air District's Community Air Risk Evaluation (CARE) program, local benefits of ozone control measures, the environmental review process, national ozone standards, and photochemical modeling.

The CCAA requires CARB to periodically assess transport of O_3 and O_3 precursors from upwind to downwind regions, and to establish mitigation requirements for upwind districts. The CCAA also requires air districts to address transport mitigation requirements in the triennial updates to strategies to achieve the state ozone standard.

The *Ozone Strateg*y provides a mechanism where the Bay Area is to:

- adopt and implement all feasible measures as expeditiously as practicable,
- adopt and implement best available retrofit control technology (BARCT) on all existing stationary sources of ozone precursor emissions as expeditiously as practicable,
- implement a stationary source permitting program designed to achieve no net increase in the emissions of ozone precursors from new or modified stationary sources that emit or have the potential to emit 10 tons or greater per year of an ozone precursor,
- strengthen existing District requirements for various stationary and area source emissions, and
- include measures sufficient to attain the state ambient air quality standard for ozone by the earliest practicable date within the North Central Coast Air Basin, that portion of Solano County within the Broader Sacramento Area, that portion of Sonoma County within the North Coast Air Basin, and that portion of Stanislaus County west of Highway 33 during air pollution episodes, provided that:

- the areas are likely to violate the state ozone standard,
- the areas are dominated by transport from the Bay Area, and,
- the areas are not affected by emissions of ozone precursors within their borders.

In addition, the Air District is required to consult with downwind districts, review the list of control measures in the most recently approved attainment plan (*2000 Clean Air Plan*), make a finding as to whether the list of control measures meets the applicable requirements, and include the finding in the proposed triennial plan revision.

The California Global Warming Solutions Act of 2006 (AB 32) requires that greenhouse gases emitted in California be reduced to 1990 levels by the year 2020 and 80 percent below 1990 levels by 2050. The 2020 reduction target equates to a decrease of an average of 30 percent below the current GHG emissions. Two major sectors that will be targeted to achieve these reductions are the energy generation sector and cement plants.

Under AB 32, CARB published its Final Expanded List of Early Action Measures to Reduce Greenhouse Gas Emissions in California (CARB 2007) which are needed to achieve the reduction goals of AB 32. These reduction goals are derived from the United Nations Intergovernmental Panel on Climate Change (IPCC: CCAT 2007) The IPCC was formed to assess “the scientific, technical and socio-economic information relevant to understanding the scientific basis of risk of human-induced climate change, its potential impacts, and options for adaptation and mitigation” (IPCC 2004). The IPCC climate stabilization models predict that a 400 to 450 carbon dioxide equivalent concentration is needed to stabilize mean global warming at an approximately 2° Celsius rise from current global mean temperature (IPCC 2001). The GHG emission reduction targets in AB 32 are needed to achieve the 400 to 450 carbon dioxide equivalent concentration and stabilize global climate change.

The California Air Resources Control Board published its Draft Scoping Plan to Mitigate Climate Change in California (CARB 2008), which describes recommendations to reduce GHG emissions. The measures will become part of California’s strategy for achieving GHG reductions under AB 32. One of the sources for the potential measures includes the Climate Action Team (CAT) Report. Three new regulations are proposed to meet the definition of “discrete early action greenhouse gas reduction measures,” which include the following: a low carbon fuel standard; reduction of HFC-134a emissions from non-professional servicing of motor vehicle air conditioning systems; and improved landfill methane capture (CARB 2008). CARB estimates that by 2020, the reductions from those three measures would be approximately 13-26 million metric tons of carbon dioxide equivalent.

Airborn Toxic Control Measure of Auxiliary Diesel Engines Operated on Ocean-Going Vessels At-Berth in a California Port, Section 229.3, Title 13, Chapter 5.1, California Code of Regulations

The purpose of regulation is to reduce hoteling (or at-berth) emissions and associated health impacts from diesel-fueled auxiliary engines onboard ships docked at California ports. Operators of container ship fleets, refrigerated cargo ship fleets are required to comply with this regulation in addition to the ports and terminals that receive them. It should be noted that the Ports of Los Angeles, Long Beach, Oakland, San Francisco, San Diego, and Hueneme are subject to this regulation. All other ocean-going fleets, terminals, and ports are not affected by the regulation.

During the development of this regulation, it was planned to include all classes of ships. A cost-benefit analysis was performed and it was determined that it would not be cost-effective to include oil tankers under CCR, Title 17, Section 93118.3. The ARB explored the potential of alternative technologies to reduce air emissions from oil tankers at berth. The ARB did not find any cost-effective solutions appropriate for oil tankers and will not be pursuing any further regulations in the near future.

4.6.3 Impact Significance Criteria

Permitted Emissions

The air quality impacts of the proposed Project would be considered adverse and significant if Shell does not comply with the terms of the Permit to Operate granted by the BAAQMD. The CEQA Guidelines state the following: "Sources of air pollutants emissions complying with all applicable District regulations generally will not be considered to have a significant air quality impact" (CEQA Guidelines, section 15064(l)). Stationary sources that are exempt from District permit requirements, because they fall below emission thresholds for permitting, will not be considered to have a significant air quality impact (unless it is demonstrated that they may have a significant cumulative impact).

Non-Permitted Emissions

In accordance with the *BAAQMD CEQA Guidelines* (*Guidelines*) (April 1996), non-permitted emissions could have a significant, adverse impact if Project operations:

- Contribute to an exceedance of localized CO emissions in excess of the CAAQS of 20 ppm for 1-hour or 9 ppm for 8 hours;
- Result in emissions which exceed the following emission thresholds:
  - ROG, 15 tons/year, 80 pounds/day;
  - NO_x, 15 tons/year, 80 pounds/day;

- PM_{10}, 15 tons/year, 80 pounds/day;

- ➢ Allow land uses that create objectionable odors;
- ➢ Expose sensitive receptors (including residential areas) or the general public to substantial levels of toxic air contaminants; or
- ➢ Potentially result in the accidental release of acutely hazardous air emissions.

GHG Emissions

The GHG analysis is based on several state agency guidance documents including the June 2008 Governor's Office of Planning and Research (OPR) Technical Advisory on CEQA and Climate Change (OPR 2008), and the State Attorney General's Memorandum outlining what is required of Lead Agencies in Analysis of Global Warming in CEQA Documents (AG 2008). Both of these documents state that although there are no state-wide thresholds at this time, each lead agency is responsible for analyzing and quantifying GHG emissions for projects under their jurisdiction, prescribing all feasible mitigation measures to improve project efficiency and reduce GHG emissions, and making a significance determination based upon the Project's ability to reduce emissions.

In order to determine whether or not a project would cause a significant effect on the environment, the impact of the project must be determined by examining the types and levels of GHG emissions generated. To date, no federal, state, or Project area local agencies have developed thresholds against which a project can be evaluated to assist lead agencies in determining whether or not the project is significant.

Cumulative Emissions

Cumulative impacts are considered significant, based on the *Guidelines* definition as follows: "Any proposed Project that would individually have a significant air quality impact would also be considered to have a significant cumulative impact." Therefore, cumulative emissions could have a significant, adverse impact if project operations:

- ➢ Contribute to a cumulatively significant effect on the emission of green house gases.

Construction Emissions

Construction activities related to the proposed Project or its alternatives would be adverse and significant if the activities do not comply with the criteria defined in the *BAAQMD CEQA Guidelines*. The *Guidelines* emphasize a qualitative approach to construction emissions, focusing on comprehensive control measures rather than a detailed quantification of emissions. Gaseous emissions from construction equipment (i.e., carbon monoxide and ozone precursors) are included in the emission inventory that is the basis for regional air quality plans, are not expected to impede attainment or maintenance of ozone and carbon monoxide standards by the Bay Area, and are therefore not subject to impact criteria. Construction impacts are generally short-term in nature and are typically associated with the production of PM_{10}. The District provides viable mitigation for PM_{10} associated with dust, not with other emissions such as exhaust. The *BAAQMD CEQA Guidelines* do set forth a series of dust abatement procedures to which adherence constitutes mitigation to less than significant levels, regardless of the level of any actual emissions that may occur.

4.6.4 Impact Analysis and Mitigation Measures

Impact AQ-1: Existing Operations' Consistency with the Applicable Air Quality Plans

Measured and calculated criteria pollutant emissions are below existing yearly BAAQMD permitted levels. Continued operation of the Shell Terminal at current throughput levels would not result in significant air quality emissions impacts (Class III). Since the facility is already operational, worker commute emissions are already part of ambient conditions, thus non-permitted emissions impacts are adverse, but not significant.

Permitted emissions include those emissions that are considered a part of the ambient air quality in the local and regional area, and have been included in the Bay Area regional air quality planning process. The Shell Terminal emissions associated with operation of the vapor recovery/thermal oxidizer, loading operations, and fugitive sources (tanks, pumps, valves, and flanges) are covered under permits to operate pursuant to the requirements of BAAQMD Regulation 2 (BAAQMD 2001). Tanker maneuvering and hoteling, tanker pumping, tugboats, etc., are calculated, as described in the Title V Permit for the Shell Terminals' facility, and included as part of the permitted emissions of the entire facility (wharf and upland tankage) as specified under the REFEMS, but are not individually permitted by the BAAQMD.

Due to the availability of accurate data, year 1995 was selected as a baseline year for permitting purposes and wharf activities were segregated from those other processes included in the REFEMS. In accordance with Table 4.6-2, these levels are:

- NOx: 176.4 tons/year
- POC: 86.2 tons/year
- SOx: 288.4 tons/year
- PM_{10}:15.5 tons/year

Emissions are influenced by a number of variables, most significantly product throughput and mode of transport. All products received by the facility are loaded into storage tanks. Emissions of vapors expelled from the loading procedure are controlled using the vapor recovery system, which consists of a vapor combustion unit called a thermal oxidizer, and associated piping from fixed roof tanks and the marine vessel loading area. Incoming liquid products shipped from the Shell Terminal into a vessel, railcar, or other container displace existing vapors in the tanks. Products shipped from the Shell Terminal into a pipeline do not displace vapor at the facility, and therefore do not cause additional emissions.

The Shell facility uses continuous emission monitors and source sampling to provide computerized monthly criteria pollutant emission inventory to the BAAQMD. The limits set by the BAAQMD were determined to be sufficient to account for these emissions. Other emissions include indirect emission sources, such as tug combustion emissions, tanker hoteling, tanker transit, and tanker pumping. These indirect emissions are not permitted, however, they are calculated per the permit conditions specified in the Shell Terminal's Title V Permit and considered as part of the overall emissions of the facility.

Section 4.6.1, Environmental Setting, describes baseline conditions taken at a point in time when reliable data became available (1995). Shell reports that in that year, 363 vessels called on the Shell Terminal. While other years have seen in excess of 400 ships without permit violation, for the purposes of this analysis the baseline is based on emissions associated with these 363 ships.

Recent years have seen a decline in Shell Terminal use. Between the years 1999 and 2005, an average of 196 vessels called on the Shell Terminal. Table 4.6-3, in Section 4.6.1, Environmental Setting, demonstrates that the emissions associated with the operation of the Shell Terminal are well within the regulatory limitations of the existing permit on file with the BAAQMD. The permit has been in place since 1980 and these emissions have been considered in the *Clean Air Plan* and *Ozone Strategy*. Because Shell operates the Refinery and Shell terminal well within REFEM Cap limitations, the continued operation of the Project does not conflict with or obstruct implementation of the applicable Plans and the impact is adverse, but less than significant (Class III).

<u>AQ-1: No mitigation is required</u>.

AQ-2: Future Operations' Consistency With the Applicable Air Quality Plans

Over the life of the lease, the anticipated vessel increase from 196 to 330 vessels per year would not exceed the limitations of the REFEMS Cap, and the impact is adverse, but less than significant (Class III).

Shell estimates that over the life of the lease, Shell Terminal operations could expand from present levels to as many as 330 vessels per year. This would represent an increase of about 68 percent over the current vessel traffic (i.e., 196 vessels per year). Assuming that the emissions generated from wharf operations are directly proportional to the number of vessels, Table 4.6-6 compares future emissions with existing emissions as well as those limitations under the REFEMS Cap used in the preparation of baseline emissions. Note that even at 330 vessels per year, Shell Terminal operations would not exceed the limitations of the REFEMS Cap and the impact is adverse, but less than significant (Class III).

While the number of vessels is estimated to increase by approximately 68 percent over current levels, at full projected use (i.e., 330 vessels per year) the number of vessels that call on the Shell Terminal would still be reduced from the 363 vessels used in the generation of baseline conditions, or even the peak levels of up to 420 vessels per year observed during the 1980s. As such, the existing number of plant personnel could handle the projected volume of vessels and any increase in the number of on-road trips associated with the augmented operation of the Shell Terminal would be extremely minimal. Impacts are adverse, but less than significant (Class III).

Table 4.6-6
Shell Terminal Future Emissions Associated
With Shell Terminal Operation (tons)

Source	NO_x	POC	PM_{10}	SO_x
1995 Terminal Emissions (tons/year) (363 Vessels)	149.3	37.3	13.8	141.5
2005 Terminal Emissions (tons/year) (196 Vessels)	80.6	20.1	7.5	76.4
Augmented Terminal Emissions (330 Vessels)	135.7	33.9	12.5	128.6
REFEMS Terminal Limit (tons/year)	176.4	86.2	15.5	288.4
Exceeds Limit?	No	No	No	No

AQ-2: No mitigation is required.

AQ-3 Dredging Operations Associated With Future Operations

Dredging activities represent short-term emissions associated with the "construction" of a deeper channel, and are not subject to the day-to-day operations' criteria so long as all PM_{10} suppression methods included in the *BAAQMD CEQA Guidelines* are administered. No fugitive dust emissions are raised during the dredging of wet sediment and none of the measures address PM_{10} associated with exhaust. As such, construction emissions associated with short-term dredging are adverse, but less than significant (Class III).

No major construction is proposed as part of the 30-year lease. Upgrades, maintenance, and repair expected as part of the 30-year lease renewal are considered minor in nature and would not contribute significantly to the baseline emissions (Class III). Shell is required to notify the CSLC of major repairs, which CSLC staff reviews for environmental applicability, among other criteria. Over the lease period, it is anticipated that the area in and around Berths #3 and #4 would be dredged.

Dredging around Berths #3 and #4 would create short-term emissions. Dredging would be of short duration (probably less than 1 week), and would not add to the long-term emissions associated with the day-to-day operation of the wharf. This would probably be performed using a clamshell dredge. A clamshell dredge is essentially a crane or dragline mounted on a barge. The clamshell could use a diesel engine of approximately 1,050 horsepower (hp). The dredge would also be fitted with one or two auxiliary generators with a combined rating assumed at approximately 500 hp.

Dredged sediments would be loaded on a barge or scow for subsequent delivery. This barge would be pulled using a tugboat. The tugboat could also be used in positioning the dredge. Tugboats can be powered by engines ranging in size from a few hundred hp to as much as 3,600 hp. This analysis assumes the use of an average value (i.e., 1,800 hp) in ascertaining vessel emissions. To derive tugboat emissions fuel consumption must first be ascertained. Presented below are the specifics for marine vessel fuel consumption.

Fuel Type	Diesel
Sulfur Content	0.20 percent
Fuel Density	7.12 lb/gal
Specific Fuel Consumption	0.40 lb/hp/hr
Idle Load Factor	0.20
Maneuver Load Factor	0.50
Cruise Load Factor	0.80

Typically, one barge would be loaded, while another is underway to and from the disposal site. In this way, little or no time would be lost waiting for equipment to perform its respective task.

In compliance with construction noise requirements, the dredge and its related equipment are assumed to operate 14 hours per day between 7:00 a.m. to 10:00 p.m. This would allow 1-hour down-time for equipment maintenance and worker breaks.

A tug is also assumed to be used in dredge placement and to remove spoils from area. Spoils would probably be taken to the Alcatraz Island disposal area approximately 32 miles from the Project site. A round-trip is estimated at about 12 hours. An additional 1 hour is assumed at idle, and 1 hour is assumed for maneuvering (14 hours per day). Emissions for the tug were calculated using *AP-42, A Compilation of Air Pollutant Emissions Factors* (*AP-42*) (USEPA, 1985). Because emissions for marine vessels vary widely and *AP-42*, does not present emissions for either SOx or PM_{10} for marine vessels, emissions factors for diesel industrial engines were utilized for these two pollutant species. These emissions are provided in gm/hp/hr as well as lb/10^3 gallons and are roughly equivalent to emission factors provided for the higher polluting heavy construction equipment.

Based on a rating of 1,800 hp, the tugboat would consume approximately 20 gallons per hour at idle, 51 gallons per hour when maneuvering, and 81 gallons per hour at cruise. Therefore, based on the noted hours of operation, the tugboat could consume approximately 1,043 gallons per day.

As many as 10 workers are allocated to operate the dredge and tug. The workers would produce emissions commuting to and from the site. In accordance with the URBEMIS8.7 model distributed by the SCAQMD, the average home-to-work trip length in the San Francisco Bay Area is 11.8 miles for urban travel. A similar value is presented for commercial-based commutes. As such, the 10 workers are estimated to generate approximately 236 miles per day. Emissions associated with these trips were estimated in accordance with the EMFAC2002 computer model distributed by the CARB using data specific to the Bay Area Air Basin. A crew boat would be used to shuttle workers to and from the dredge. However, the boat could be stationed at the Shell Terminal or neighboring Martinez Marina and any emissions associated with the movement of personnel between the shore and the equipment would be inconsequential.

Table 4.6-7 outlines the projected emissions associated with the use of a clamshell dredge and the tugboat. Because these represent short-term emissions associated with the “construction” of a deeper channel, they are not subject to the day-to-day operations’ criteria so long as all PM_{10} suppression methods included in the *BAAQMD CEQA Guidelines* are administered. Note that all of the measures included in the *Guidelines* focus on the reduction of PM_{10} associated with fugitive dust. No fugitive dust emissions are raised during the dredging of wet sediment and none of the measures address PM_{10} associated with exhaust. As such, construction emissions associated with short-term dredging are adverse, but less than significant (Class III).

Table 4.6-7
Daily Emissions for Vessels and Equipment Associated With Dredging Operations (lb/day)

Emission Source	CO	NO_X	ROG	SO_X	PM_{10}
Permitted Sources					
Clamshell Dredge[1]	80.9	352.8	10.4	23.8	10.3
Generator[2]	46.8	217.0	17.6	14.4	15.4
Total Permitted Emissions	127.7	569.8	28.0	38.2	25.7
Un-Permitted Sources					
Tugboat[3]	86.3	360.6	22.5	38.1	10.3

Table 4.6-7 (continued)
Daily Emissions for Vessels and Equipment Associated with Dredging Operations (lb/day)

Emission Source	CO	NO_X	ROG	SO_X	PM_{10}
Worker Commutes	3.8	0.4	0.4	0.1	0.0
Total Un-Permitted Emissions	90.1	361.0	22.9	38.2	10.3
Total Daily Emissions	217.8	930.8	50.9	76.4	36.0

[1] **Based on a 1,050 hp diesel engine operating 14 hours per day. Emission factors are as per *AP-42*, 1995, Table 3.4-1, Gaseous Emissions Factors for Large Stationary Diesel and All Stationary Dual-Fuel Engines.**
[2] **Based on 500 hp diesel engine operating 14 hours per day. Emission factors are as per *AP-42*, 1995, Table 3.3-1, Emission Factors for Uncontrolled Gasoline and Industrial Engines.**
[3] **Based on an 1,800 hp diesel vessel operating 1 hours per day at idle 1-hour maneuvering and 12 hours per day at cruise. Emission factors for CO, NOx, and ROG are as per *AP-42*, 1985, Table II-3.3, Diesel Vessel Emission Factors By Operating Mode. Emission factors for SOx and PM_{10} are as per *AP-42*, 1985, Table II-7.1, Emission Factors for Heavy-Duty Diesel-Powered Construction Equipment, for a miscellaneous piece of diesel-powered, heavy-duty construction equipment.**

<u>AQ-3: No mitigation is required</u>.

AQ-4: Expose Sensitive Receptors to Substantial Pollutant Concentrations.

The Shell Terminal is in compliance with the BAAQMD permitting for hazardous and toxic pollutants. Impacts are adverse, but less than significant (Class III).

Substantial pollutant concentrations are typically associated with fixed sources, such as a refinery stack, or as carbon monoxide hot spots in areas where vehicles queue such as at an intersection. Because the wharf and its operations have been permitted through the BAAQMD, Shell has satisfied the requirements related to both toxic air contaminants and accidental release of acutely hazardous air emissions. Necessary hazardous and toxic pollutant modeling, as well as necessary contingency measures, have been submitted as part of the permitting process and are on file with the BAAQMD. The BAAQMD would not issue appropriate permits without adequate documentation and mitigation. Impacts are adverse, but less than significant (Class III).

Furthermore, because operations at the Shell Terminal only require a minimum of workers, and no substantial increase in the number of workers would occur even with future augmented operations, the Project would not result in the addition of vehicles to the road that would result in the formation of CO hot spots. The impact is adverse, but less than significant (Class III.)

<u>AQ-4: No mitigation is required</u>.

Impact AQ-5: Create Objectionable Odors

No sensitive receptors are located in the immediate area and the Shell Terminal does not emit odors that are/have been reported in the local area. Impacts are adverse, but less than significant (Class III).

The primary source of odors from the Shell Terminal would be fugitive POC emissions escaping to the atmosphere during loading and unloading operations. These odors are typically removed in the vapor recovery system, which captures and destroys the POC in a thermal oxidizer. POCs are broken down to largely odorless compounds of water and carbon dioxide. No increase in odors would be expected due to the continued operation of the Shell Terminal under the conditions of the proposed 30-year lease. Therefore, the impact is adverse, but less than significant (Class III).

AQ-5: No mitigation is required.

Impact AQ-6: Increase in Greenhouse Gas Emissions

Measured and calculated greenhouse gas emissions are below 1995 baseline levels. Continued operation of the Shell Terminal at current throughput levels would not result in significant greenhouse gas emissions impacts (Class III). Since the facility is already operational, greenhouse gas emissions are already part of ambient conditions, greenhouse gas emissions impacts are adverse, but not significant.

An individual project will not generate enough GHG emissions to influence global climate change (AEP 2007). The Project participates in this potential impact by its incremental contribution combined with the cumulative increase of all other sources of GHGs, which when taken together form global climate change impacts. The following discussion reviews each of the GHGs and the Project's potential generation of these gases.

Carbon Dioxide

The Project's main contribution to GHGs is carbon dioxide. The Project will generate emissions of carbon dioxide primarily in the form of exhaust emissions from ocean-going vessels and tug boats. The carbon dioxide emissions are shown in Table 4.6-8.

Table 4.6-8
Carbon Dioxide Emissions

Emission Source	Carbon Dioxide Emissions (metric tons per year)	Global Warming Potential (GWP) (metric tons per year)
Terminal Emissions (1995)	4,955	4,955
Terminal Emissions (2007)	2,675	2,675
Terminal Emissions (Proposed Lease)	4,505	4,505
Project Comparison to 1995 Emissions	-450	-450
Project Comparison to 2007 Baseline	1,830	1,830

Note: Totals are rounded.

Methane

The Project will generate vapor emissions of methane gas from non-loading venting, cargo-loading venting, and fugitive emissions from flanges and pumps. Vapor emissions of methane were estimated using EPA emission factors shown in Annex F, Methodology for Estimating Methane Emissions from Petroleum Systems (EPA 2000b). Methane emissions will also be generated from ocean-going vessels and tug boats during terminal activities. These emissions were calculated using EPA emission factors found in the Analysis of Commercial Marine Vessels Emissions and Fuel Consumption Data (EPA 2000) and AP-42 emission factors. The emissions are shown in Table 4.6-9.

Table 4.6-9
Methane Emissions

Emission Source	Methane Emissions (metric tons per year)	Global Warming Potential (metric tons per year)
Terminal Emissions (1995)	82	1,729
Terminal Emissions (2007)	45	949
Terminal Emissions (Proposed Lease)	76	1,597
Project Comparison to 1995 Emissions	-6	-132
Project Comparison to 2007 Baseline	31	648

Note: Totals are rounded.

Nitrous Oxide

The Project generates small amounts of nitrous oxide associated with exhaust emissions of ocean-going vessels and tug boats. Nitrous oxide was estimated using EPA emission factors for marine vessels (EPA 2000). The emissions are presented in Table 4.6-10.

Table 4.6-10
Nitrous Oxide Emissions

Emission Source	Nitrous Oxide Emissions (metric tons per year)	Global Warming Potential (GWP) (metric tons per year)
Terminal Emissions (1995)	0.0108	3
Terminal Emissions (2007)	0.0059	2
Terminal Emissions (Proposed Lease)	0.0099	3
Project Comparison to 1995 Emissions	0.0009	0
Project Comparison to 2007 Baseline	-0.0049	1

Note: Totals are rounded.

Table 4.6-11 below summarizes predicted GHG emissions resulting from the continuation of the lease with an increase of activities of up to 330 vessels per year, transporting approximately 36,000,000 barrels of crude oil and/or Refinery product. This proposed increase in activity is considered the “end use”. The anticipated increase up to 330 vessels is allowed under the current lease.

Table 4.6-11
Inventory Summary of Predicted Future Greenhouse Gas Emissions of Lease Period

Source	CO_2 Metric Tons/yr	CH_4 Metric Tons/yr	N_2O Metric Tons/yr	CO_2E Metric Tons/yr
Ballast Emissions	0	0	0	0
Vapor Control Equipment	0	0	0	0
Fugitive Emissions	0	2	0	37
Tank Standing Losses	0	30	0	630
Tank Withdrawal Losses	0	34	0	709
Cargo Loading Emissions	0	8	0	160
Tanker Pumping Emissions	600	0	0	608
Tanker Transit Emissions	1,973	1	0.00	2,001
Tanker Hoteling Emissions	188	0	0.00	191
Tug Combustion Emissions	1,744	1	0.00	1,768
Total Emissions	**4,505**	**76**	**0.00**	**6,104**

Note: Totals are rounded.

In summary, the primary GHG generated by the Project would be carbon dioxide. Emissions of methane and nitrous oxide are small in comparison to carbon dioxide. However, due to the global warming potential of methane and nitrous oxide, these greenhouse gases also contribute to the total global warming potential of Project-generated greenhouse gases. Table 4.6-12 summarizes the Global Warming Potential of GHG emissions generated by the Project.

Table 4.6-12
Global Warming Potential

Emission Sources	Global Warming Potential (GWP) (metric tons per year)
Terminal Emissions (1995)	6,687
Terminal Emissions (2007)	3,626
Terminal Emissions (Proposed Lease)	6,104
Project Comparison to 1995 Emissions	-583
Project Comparison to 2007 Baseline	2,478

Historical total GHG baseline emissions associated with the Shell Terminal operations varied from 3,626 (2007) to 6,687 (1995). Average total emissions cannot be calculated due to lack of consistent data. Therefore, the GHG emissions from the project vary from 3,626 to 6,687 tons per year, or from below 1995 baseline or 2,478 tons per year above the 2007 baseline.

Because the goal of AB 32 is to reduce the statewide GHG emissions to the 1990 baseline by 2020, and the estimated Shell Terminal emissions are below the 1995 levels, continuing the operation of the terminal should not result in a cumulative effect on the emissions of greenhouse gases.

AQ-6: No mitigation is required.

4.6.5 Impacts of Alternatives

Impact AQ-7: No Project Alternative

Decommissioning of the Shell Terminal would be subject to short term construction air quality impacts that would be adverse, but less than significant (Class III). With No Project, there would be no operations or emissions at the Shell Terminal (Class IV), however, operations would be transferred to other Bay Area marine terminals.

Under the No Project Alternative, Shell's lease would not be renewed and the existing Shell Terminal would be subsequently decommissioned with its components abandoned in place, removed, or a combination thereof. The decommissioning of the Shell Terminal would follow an Abandonment and Restoration Plan as described in Section 3.3.1, No Project Alternative.

Under the No Project Alternative, alternative means of crude oil/product transportation would need to be in place prior to decommissioning of the Shell Terminal, or the operation of the Shell Refinery would cease production, at least temporarily. It is more likely, however, that under the No Project Alternative, Shell would pursue alternative means of traditional crude oil transportation, such as a pipeline transportation, or use of a different marine terminal. Accordingly, this Draft EIR describes and analyzes the potential environmental impacts of these alternatives. For the purposes of this Draft EIR, it has been assumed that the No Project Alternative would result in a decommissioning schedule that would consider implementation of one of the described transportation alternatives. Any future crude oil or product transportation alternative would be the subject of a subsequent application to the CSLC and other agencies having jurisdiction, depending on the proposed alternative.

Decommissioning would be assumed to be accomplished primarily via the water with materials taken away via barge, other than those that can be used at the Shell Refinery. The activity would require heavy equipment to be used in the demolition of the wharf and related structures. However, this would effectively curtail any ships from berthing at the terminal and the reduction in emissions associated with terminating terminal operations would compensate for any emissions generated during demolition. Furthermore, demolition of the wharf would be construed as construction and as noted for dredging operations, construction is considered as adverse, but less than significant (Class III) so long as all feasible dust implementation measures presented in the *BAAQMD CEQA Guidelines* are adhered to. Impacts would be adverse, but less than significant (Class III).

After decommissioning, the operations associated with the Shell Terminal would cease resulting in a slight beneficial impact (Class IV). However, for the air basin, operations would be transferred to other Bay Area marine terminals. These terminals would be subject to review by BAAQMD to determine whether the increase in operations would be in compliance with permitting.

<u>AQ-7: No mitigation is required</u>.

Impact AQ-8: Full Throughput Alternative

One or more existing terminals would be used for crude and product transfers for the Shell Refinery. New pipelines would be required to connect to the Shell Refinery. Impacts would be adverse, but less than significant (Class III).

Existing terminals would pose no air quality impacts so long as they operate within BAAQMD permit conditions. Any expansion would require permitting under the requirements and guidance of the BAAQMD. Emissions associated with the existing Shell Terminal could be banked and applied to the terminal expansion. If necessary, terminal owners/operators could reduce emissions at their inland facilities or purchase emissions offset credits such that no new emissions would be associated with any expansion and any impacts would be adverse, but less than significant (Class III).

Construction of new pipelines would be subject to requirements for dust suppression outlined in the *BAAQMD CEQA Guidelines* requiring dust suppression in accordance with the projected level of activity. Adherence to these requirements would ensure that any impacts remain adverse, but less than significant (Class III).

<u>AQ-8: No mitigation is required</u>

4.6.6 Cumulative Projects Impacts Analysis

Impact CUM-AQ-1: Cumulative Air Quality Emissions

Cumulative projects in the region contribute to cumulative emissions in the region. The Project is permitted through the BAAQMD and Project emissions are

included in the applicable *Clean Air Plan* and *Ozone Plan*. As such, the Project does not add significantly to a cumulative impact (Class III).

The proposed Project and other projects in the region will continue to generate air emissions over the life of the lease and thereby contribute to cumulative emissions within the region. At the level of current operations, Shell Terminal emissions are within the existing baseline conditions and will not contribute additional emissions to the cumulative impact. The potential future increase in operations could result in potentially significant adverse impacts that would be reduced to a level of adverse, but less than significant (Class III) through the use of improved technology and BAAQMD requirements.

CUM-AQ-1: No mitigation is required.

4.6.7 Air Quality impacts and Mitigation Measures

Table 4.6-13 summarizes Air Quality impacts and mitigation measures.

Table 4.6-13
Summary of Air Quality Impacts and Mitigation Measures

Impacts	Mitigation Measures
AQ-1: Existing Operations' Consistency with the Applicable Air Quality Plans.	**AQ-1:** No mitigation required.
AQ-2: Future Operations' Consistency with the Applicable Air Quality Plans.	**AQ-2:** No mitigation required.
AQ-3: Dredging Operations Associated with Future Operations	**AQ-3:** No mitigation required.
AQ-4: Expose Sensitive Receptors to Substantial Pollutant Concentrations	**AQ-4:** No mitigation required.
AQ-5: Create Objectionable Odors	**AQ-5:** No mitigation required.
AQ-6: Increase in Greenhouse Gas Emissions	**AQ-6:** No mitigation required.
AQ-7: No Project Alternative	**AQ-6:** No mitigation required.
AQ-8: Full Throughput Alternative	**AQ-7:** No mitigation required.
CUM-AQ-1: Cumulative Air Quality Emissions	**CUM-AQ-1:** No mitigation required.

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